

## **Broadway-Pantano**

### **Boundaries:**

The site is located in east-central Tucson and is bounded approximately by Speedway Boulevard to the north, Pantano Wash to the east, Calle Madero (south of Broadway Boulevard) to the south, and Sahuara Avenue (west of Wilmot Road) to the west. The site consists of the closed municipal Broadway North Landfill (BNL) and the tetrachloroethene (PCE) contaminant plume.

### **Site History:**

- The BNL property, which is the major source of contamination at this site, was originally developed as a sand and gravel mining operation in the mid-1940s. From approximately 1960 to 1971, Pima County Sanitary District #1, the City of Tucson (City), and Pima County (County) operated municipal landfills at the sand and gravel pits. After the 1971, the BNL was covered with soil and the land has been left undeveloped up to the present.
- PCE was detected in a City water well at the western edge of the landfill in 1987. In 1989 and 1991, two other City wells downgradient of the landfill were shut down because of PCE contamination. In 1998, a fourth City well was shut down because of PCE contamination. The groundwater contamination extends approximately two miles to the west from the BNL.
- The site was placed on the WQARF Registry in December 1998 with an eligibility and evaluation score of 48 out of a possible 120. Subsequently, the site was reevaluated and the score was raised from 48 to 57 in July 1999.
- In March 1998, the City and County issued an RI report for the Landfill Operable Unit. This report confirmed that the BNL was a major source of the groundwater contamination at the site.
- In December 2000, Home Depot completed a report regarding its investigation of properties located on and immediately adjacent to the south of the BNL which indicated that dross (metal waste) had been buried on these properties. Home Depot covered the dross site with soil and temporarily fenced off the part of the dross site not overlain by buildings and pavement. ADEQ later replaced the temporary fence with a permanent fence and warning signs.
- In the 1990s, the City and County regularly monitored groundwater wells at and near the site, and the City installed groundwater monitoring wells to help delineate the groundwater contamination. The City also developed a site groundwater model for use in designing a containment system to prevent further migration of the groundwater contaminant plume within the City's central well field. In late 2000/early 2001, the design of the Western Containment System (WCS) was completed by the City and approved by ADEQ. In June 2002, the City issued an RI report for the Groundwater

Operable Unit. This report documents the results of investigations conducted through 2000.

- In June 2000, the City and County completed installation of a deep soil vapor extraction/air injection system (SVE/AI) at the BNL in June 2000. Clean air is injected deep below the landfill, and contaminated soil gas is extracted and treated with granular activated carbon (GAC) to remove the PCE. The purpose of this early response action (ERA) is to prevent, to the extent practicable, additional PCE from contaminating the groundwater. From June 2000 through September 2002, the SVE/AI removed over 5,000 pounds of volatile organic compounds (VOCs), including 1,200 pounds of PCE from the vadose zone. In September 2002, the system was turned off in order to conduct a rebound test. December 2002 and May 2003 soil gas testing results showed insufficient rebound to warrant continued operation of the system.
- In June 2001, ADEQ and the City executed a workshare agreement under which the City would manage the construction of the WCS with ADEQ oversight and ADEQ would reimburse the City for most of the costs. Under this agreement, ADEQ took over responsibility for operating the SVE/AI.
- With the execution of the workshare agreement, ADEQ took over the investigation and remediation of the site. From 2001 through 2003, ADEQ installed 13 groundwater monitoring wells needed to complete the RI (and to conduct performance monitoring for the WCS).
- In November 2002, ADEQ completed a focused investigation to determine whether an ERA was required to protect or provide for the use of the water from City wells C-025B and D-018A, located south of Broadway and west of the Broadway South Landfill (BSL). Another aim of this investigation was to determine whether the BSL, which was releasing PCE to groundwater, was contributing to the groundwater contamination at the site. The data collected indicate that an ERA was not warranted at this time. The data also showed that the BSL was not contributing to the groundwater contamination at the site. Subsequently, the BSL site was referred to the Site Assessment Unit for further evaluation.
- In the spring of 2003, ADEQ and the City completed the installation of the Western Containment System (WCS) at the western edge of the plume. The total construction costs for this early response action were approximately \$3 million and were funded by ADEQ. On March 24, 2003, the WCS began full operation (1100 gallons per minute). The City operates and maintains the system with ADEQ oversight and funding, and ADEQ conducts the performance monitoring for the system. Analytical results show that the GAC is removing the PCE to non-detectable levels.
- ADEQ conducted surface soil testing at the landfill in April 2003. Thirty-five samples were collected from topographically low areas and locations where it appeared that a release of some substance(s) may have occurred previously. These samples were tested for semivolatile organic compounds, metals, pesticides, and polychlorinated biphenyls

(PCBs). Twelve samples were collected approximately 25 feet beyond the dross site fence perimeter and tested for metals. For the constituents tested in these samples, none were found above the Arizona residential or non-residential soil remediation levels.

- In November 2004, groundwater monitoring results indicated that the BSL PCE plume was merged with the BNL PCE plume. Subsequent sampling events confirmed these results. ADEQ is expanding the RI to include characterization of the BSL.
- In August 2005, the City of Tucson installed two groundwater monitoring wells to help evaluate the effectiveness of WCS capture. Groundwater samples were collected from these two wells in September 2005 and ADEQ is awaiting final results.

#### **Site Status:**

- **Western Containment System (WCS):** During the first year of operation, the WCS treated approximately 360 million gallons of PCE-contaminated groundwater. The WCS is presently pumping at approximately 800 gallons/minute (gpm) – 400 gpm from the C-026B extraction well and 400 gpm from the R-092A extraction well. In the summer of 2003, the injection capacities in the R-090A and R-091A injection wells decreased because of plugging—the R-090A well significantly so. Subsequently, both wells were rehabilitated/redeveloped and injection capacities improved. Thus, backflushing of the injection wells is performed regularly to maintain performance.
- **Soil Vapor Extraction/Air Injection (SVE/AI) System:** In June 2004, four deep soil gas monitoring wells were installed to provide sampling points for performance testing in large areas where there are no existing deep soil gas monitoring wells. Each well was equipped with six nested probes with the shallowest probe set at approximately 50 feet below ground surface (bgs) and the deepest probe set at approximately 300 feet bgs. These new wells and the entire SVE/AI soil gas monitoring network were sampled in mid-June 2004. The SVE/AI system was shut down in September 2002. Soil gas samples collected during three sampling rounds conducted since the SVE/AI system shut down showed negligible rebound of the constituents of concern. ADEQ has determined that bringing the SVE/AI system back on line is not necessary based on existing information.
- **Shallow Soil Gas Pathway:** In December 2002, ADEQ collected soil gas samples from the shallow methane monitoring probes located along the southwest perimeter. These samples were tested for PCE and other VOCs. This testing was performed to evaluate the shallow soil gas pathway to the adjacent residences. The results of this testing indicated that additional testing was needed. In April 2003, ADEQ performed VOC soil gas testing at the ground surface using flux chambers. These results were evaluated by SOMA, a risk assessment consulting company. Further evaluation of these data are being performed to determine whether additional soil gas investigative work is needed in order to complete the assessment of this potential exposure pathway.
- **Remedial Investigation (RI):** ADEQ has been preparing the draft RI Report and the

Land & Water Use Study, which will be an appendix to the draft RI Report. ADEQ will be expanding the RI to include the BSL. Considerable field work has already been done for the BSL groundwater pathway. ADEQ is presently reviewing available historical records on the BSL to determine if additional work will be needed.

#### **Site Hydrogeology:**

- The site is located within the Tucson Basin, a northwest trending structural basin filled with alluvial sediments. The sediments at the site consist predominantly of sand and sandy gravel and are relatively unconsolidated down to approximately 500 feet bgs. At approximately 500 feet bgs, marked consolidation is seen with a correspondingly significant decrease in aquifer permeability.
- Depth to groundwater at the site ranges from approximately 315 feet bgs to 370 feet bgs, and the groundwater generally flows to the west/northwest.

#### **Contaminants:**

The contaminants in groundwater currently exceeding the Aquifer Water Quality Standards (AWQSs) are PCE, trichloroethene, vinyl chloride, and methylene chloride. Cis-1,2-dichloroethene, which has historically been considered a groundwater contaminant of concern, has not been detected in site groundwater at a level exceeding the AWQS since 2003. The contaminants in soil at the dross site currently exceeding the Arizona residential soil remediation levels are arsenic, cadmium, chromium, copper, and lead. Beryllium has also been found at a concentration exceeding the soil remediation level in one subsurface soil sample north of the dross site. Contaminants of concern for soil gas are being evaluated. Contaminants of concern at the site may change as new data become available.

#### **Public Health Impact:**

No one is known to be drinking contaminated water from this site and therefore no one is known to be at risk of exposure to these groundwater contaminants. The City's policy is to shut down any City water supply well containing a VOC concentration that reaches one-half of the regulatory level. The St. Joseph's Hospital's well water treatment system removes the VOCs to non-detectable levels. If you are drinking water from a private well within the boundaries of the site, contact the ADEQ Project Manager to have your water tested.

The City and County's 1998 landfill investigation report included the results of a risk assessment. This risk assessment was based on assumptions that were extremely protective of human health. It was concluded that there is no emergency risk to residents next to the landfill, yet the risk assessment did indicate that there is a possible future risk of VOC-contaminated landfill gases migrating underground toward residences next to the landfill if the landfill gases were left uncontrolled.

ADEQ has performed soil gas testing along the southwest perimeter of the landfill and is evaluating whether more testing is needed to evaluate this potential exposure pathway.

The dross site is covered with soil and fenced with warning signs to prevent public exposure.

### **Community Involvement Activities:**

A community advisory board (CAB) was formed in January 2000 and meets on a regular basis. These meetings are open to the public. The CAB meeting agendas and minutes can be viewed at <http://www.azdeq.gov/envIRON/waste/sps/meeting.html>.

### **Information Repositories:**

Interested parties can review site information at the Wilmot Library located at 530 North Wilmot Road in Tucson, (520) 791-4627. Site information is also available at both ADEQ's Southern Regional Office located at 400 W. Congress, Suite 433 in Tucson, and the main office located at 1110 W. Washington Street in Phoenix. Files are available for review Monday through Friday from 8:00 a.m. to 5:00 p.m. Please call (520) 628-6715 to arrange a file review appointment at the Southern Regional Office. To arrange for a time to review the site file at the main ADEQ office, please call the ADEQ Records Center at (602) 771-4380 or (800) 234-5677 (Arizona toll-free).

### **Contacts:**

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\* In Arizona, but outside the Tucson area, call toll free (888) 271-9302.